

IN THE DRAWINGS:

Figures 6 and 7 have been amended as shown on the replacement sheet attached hereto.

REMARKS

In the Office Action dated March 7, 2005, Figures 6 and 7 were objected to under 37 C.F.R. § 1.84(l). Figures 6 and 7 have been amended to correct those informalities, as shown on the replacement sheet attached hereto. Other than being amended to respond to the aforementioned informalities, no changes have been made in Figures 6 and 7.

Claims 1 and 2 were rejected under 35 U.S.C. §102(b) as being anticipated by Unger et. al..

Independent claim 1 has been amended to make clear that the automatic limitation of the tube current of the x-ray tube takes place online while the attenuation data are being obtained, that will subsequently be used to produce a computed tomography image of the examination subject. This is consistent with the disclosure in the application as originally filed at page 11, lines 11 and 12.

Applicants respectfully submit that claim 1, and claim 2 depending therefrom, are not anticipated by the Unger et. al. reference for the following reasons. The computed tomography apparatus disclosed and claimed in the present application automatically limits the tube current of the x-ray tube online during the acquisition of measurement data for a region of an examination subject, that exhibits attenuation comparable to the attenuation of at least one phantom from which attenuation data have been acquired in advance of the examination of the subject. This allows a noise level and an image quality to be achieved in the image of the region of the examination subject that are comparable to the noise level and the image quality in the previously-obtained image of the phantom.

The inventive apparatus is particularly suited for use in obtaining images of body regions such as the shoulder, thorax or the abdomen, wherein the tube current varies along the longitudinal length of the examination subject, as shown in Figure 7 with dotted lines.

With regard to the Unger et al. reference, Applicants do not agree with the Examiner's statement that the Unger reference concerns a method for automatically controlling x-ray dosage for producing an image by computed tomography. The Unger et al. reference does not provide teachings related to the production of computed tomography images, but instead provides teachings exclusively related to "single shot" radiographic images. This is clear in the description in the Unger et al. reference in paragraphs [0007] through [0013]. In paragraph [0007], the Unger et al. reference describes computed tomography systems for screening lung cancer, and states that the cost and dosage associated with the use of computed tomography systems for such screening purposes may be prohibited. Therefore, in paragraph [0008], the Unger et al. reference teaches that single shot radiography (RAD) is typically less expensive and employs a lower radiation dose for an examination than a conventional computed tomography system. Nevertheless, RAD systems exhibit certain disadvantages with regard to the use of such systems for screening for lung cancer. As a starting point for this discussion, the Unger et al. reference refers to a technique in paragraph [0009] known as "dual energy." The Unger et al. reference begins from this state of the art, i.e., conventional RAD systems based on the concept of dual energy (paragraph [0011]) when describing the object of the Unger et al. invention in paragraph [0012]. This object is to provide a method and an apparatus to control and adjust the parameters for the second exposure obtained

with such a dual energy system. This second exposure is described in the context of the Unger et al. reference only with regard to dual energy RAD systems, which are single shot systems. Such single shot systems are substantially different from computed tomography systems, as is well known to those of ordinary skill in the field of radiological imaging. Compute tomography systems provide a spiral or helical scan of an examination region by obtaining projection data sets from a number of different projection directions. Moreover, a relative complicated computed tomography reconstruction algorithm has to be employed in order to obtain an image from the projection data sets (attenuation data) obtained in this manner.

The Examiner referred to the usage of the term "chest scan" in paragraph [0029] of the Unger et al. reference in support of the Examiner's position that the Unger et al. reference concerns computed tomography. The use of term "chest scan" at that location in the Unger et al. reference does not refer to obtaining projection data sets with a moving radiation source, as in the case of computed tomography, nor would the use of that phrase at that location in the Unger et al. reference be understood by those of ordinary skill in the field of radiology to refer to computed tomography. Some writers use the phrase "scan" to refer to simple (static) radiographic images without any movement of the source or the object.

Furthermore, in the method disclosed in the Unger et al. reference, the parameters that are derived from the first exposure of the dual energy technique, and the values obtained from the calibration phantoms, are not used to automatically limit the tube current of the x-ray tube online during acquisition of the attenuation data, as in the inventive method. Instead, in the Unger et al. reference the parameters that are derived from the first exposure of the dual energy technique are

used to set the parameters in the second exposure, before beginning that second exposure. This is explicitly shown in Figure 1 of the Unger et al. reference, blocks 150 and 160, and is explained at paragraph [0025]. The only parameter that is automatically controlled during the acquisition of attenuation values is the duration of the exposure, as explained in paragraph [0020].

Therefore, the Unger et al. reference does not disclose all of the method steps of claims 1 and 2 of the present application, and thus does not anticipate either of those claims.

In paragraph 7 of the Office Action, claim 3 was stated to be rejected under 35 U.S.C. §103(a) as being unpatentable over the Unger et al. reference, however, in paragraph 9 the Examiner acknowledges that the Unger et al. reference does not explicitly state that the tube current is automatically adjusted while irradiating an examination subject, and in paragraph 10 the Examiner relied on the Sones reference as allegedly providing such a teaching. Applicants therefore will assume that the Examiner intended to reject claim 3 under 35 U.S.C. §103(a) as being unpatentable over Unger et al. and Sones.

The aforementioned statements regarding the teachings of the Unger et al. reference are applicable to overcome this rejection under 35 U.S.C. §103(a) as well.

As to the Sones reference, even though the radiation source is moved in the technique disclosed therein, this movement is not to produce a “scan” in the sense of a computed tomography scan, but is only to avoid the use of films or two-dimensional detector arrays, and thus allows the use of a one-dimensional line or row of detectors. Moreover, Sones merely provides a teaching that during a radiographic “scan,” as shown in Figure 1 of the Sones reference, for example, the

tube current can be reduced as a function of the position in the scanning path, because the scanned subject exhibits reduced thickness at the right side and left side. This change in the tube current during such a "scan" is coupled to the angular position of the source and the detector, and is *not* dependent on the actual attenuation of the subject. Equally as importantly, it is impossible to physically incorporate the radiation source/detector arrangement shown in Figure 1 in a computed tomography apparatus. Applicants recognize that in order to substantiate a rejection under 35 U.S.C. §103(a) that is based on a combination of references, it is not necessary that structure in the secondary apparatus be physically incorporated in the structure of the primary apparatus, however, it is nevertheless incumbent on the Examiner, in order to substantiate such a rejection, to propose a combination that some hope of actually being built. In view of the complete physical incompatibility of the structure disclosed in the Sones reference with a rotating computed tomography system, and in view of the fact that the Unger et al. reference is not directed to computed tomography at all, Applicants respectfully submit that the Examiner, at best, is proposing a combination of concepts that does not even rise to the level of an "obvious to try" proposal. As the Examiner is aware, the United States Court of Appeals for the Federal Circuit has many times stated that "obvious to try" does not rise to the level of "obviousness" under 35 U.S.C. §103(a).

Lastly, Sones provides no teachings or discussion whatsoever with regard to noise levels in the images or a comparison of data with reference measurements.

Therefore, Applicants respectfully submit a person of ordinary skill in the field of designing computed tomography systems would find no teaching, motivation, or inducement to modify the apparatus disclosed in the Unger et al. reference in

accordance with the teachings of Sones. Moreover, even if such a combination were made (for reasons unknown to the present Applicants), the subject matter of claim 3, which embodies the subject matter of claim 1 therein, still would not result. Claim 3, therefore, would not have been obvious to a person of ordinary skill in the field of designing computed tomography systems based on the teachings of Unger et al. and Sones, under the provisions of 35 U.S.C. §103(a).

All claims of the application are therefore submitted to be in condition for allowance, and early reconsideration of the application is respectfully requested.

Submitted by,

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